



**Naval Facilities Engineering Command Southwest
San Diego, California**

**FINAL
BACKGROUND SOIL STUDY REPORT
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST**

**FORMER HUNTERS POINT NAVAL SHIPYARD,
SAN FRANCISCO, CALIFORNIA**

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SECTION 7

Use of Background Data

The primary purpose of the background soil study was to establish representative background soil concentrations for comparison and evaluation of soil data collected from HPNS. **Section 7.1** presents a summary of available background data, including the HPNS BTVs for soil and an evaluation of other background studies to determine if the observed background values at HPNS were consistent with values reported in literature. Background values are provided for comparison and use during data evaluation for the planned removal site evaluation activities at Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 and for future site characterization and assessment at HPNS (**Section 7.2**).

7.1 Hunters Point Naval Shipyard Soil Background Threshold Values and Comparison to Other Background Values

HPNS was created from fill materials originating from multiple offsite sources, including fill from the hilltop immediately north of HPNS, sediment dredged from San Francisco Bay, and material imported from local quarries and construction sites. The original distribution of background radioactivity in the fill material has changed over time because of backfilling and mixing. Concentrations from NORM and fallout radionuclides in former surface soil may be situated in subsurface soil today. Based on the expected variability, the surface and subsurface soil sample results were combined for development of the BTVs. The offsite BTVs were generally within or similar to the range of onsite BTVs² (**Table 7-1**).

Table 7-1 Background Threshold Values

Radionuclide	Offsite BTV (pCi/g)	Range of Onsite BTVs (pCi/g)
¹³⁷ Cs	0.141	0.0523 - 0.477 ^a
²³⁹ Pu/ ²⁴⁰ Pu	0.515	0.378 – 0.494
²²⁶ Ra	0.861	1.13 - 1.35
⁹⁰ Sr	0.150	0.149 - 0.150
²³² Th	1.63	1.42 - 2.21
²³⁵ U/ ²³⁶ U	0.145	0.129 - 0.245

Notes:

^a The maximum onsite BTV, 0.477 pCi/g, is based on data collected from RBA-4 and will be considered for comparison to concentrations encountered in areas where topography and surface runoff may have caused ¹³⁷Cs from fallout to accumulate over time.

pCi/g = picocurie(s) per gram

Additional background data from a literature review were evaluated to determine if the observed background values at HPNS were consistent with values reported in literature. This evaluation included review of analytical results of ROCs and NORM constituents, analytical methods, soil lithology, and geographic latitude. The ROCs for future investigations at HPNS include naturally occurring (primordial) and man-made radionuclides. Reported

² Based on comments received from the regulatory agencies on the Draft Report (**Appendix A**), data collected from RBA-3 will not be used for site data comparisons and were excluded from the range of BTVs presented in **Table 7-1**.

concentrations of these ROCs in background soil for the United States, including regional data collected in California, and the HPNS RGs are provided in **Table 7-2** for comparison to the BTVs.

Table 7-2. Concentrations of Radionuclides Reported in Literature and Remediation Goals

Radionuclide	Range of Literature Values (pCi/g) ^a	HPNS Remediation Goal (pCi/g) ^b
¹³⁷ Cs	0.083 - 1.67	0.113
²³⁹ Pu	0.00344 - 0.02	2.59
²²⁶ Ra	0.1 - 3.8	1.0 ^c
⁹⁰ Sr	0.069 - 0.75	0.331
²³² Th	0.1 - 3.5	1.69
²³⁵ U	0.1 - 0.63	0.195

Notes:

^a Concentrations of ¹³⁷Cs and ⁹⁰Sr are decay-corrected based on the historical study or sampling date.

^b From Navy, 2006.

^c Limit is 1 pCi/g above background, per agreement with USEPA.

References: Cabrera Services, 2004; Litaor, 1995; LLNL, 1999; McArthur and Miller, 1989; Tykva and Sabol, 1995; USEPA, 2011; Volkle et al., 1989; Wallo et al., 1994

Concentrations of ²²⁶Ra and ²³²Th across the United States have been reported with concentrations ranging from 0.1 to 3.8 pCi/g for ²²⁶Ra and 0.1 to 3.5 pCi/g for ²³²Th (Tykva and Sabol, 1995). Concentrations on the higher end of this range have been reported in California, including 1.88 pCi/g for ²²⁶Ra and 2.87 pCi/g for ²³²Th (USEPA, 2011). The ranges of HPNS ²²⁶Ra, ²³²Th, and ²³⁵U BTVs are consistent with values reported in literature.

For the anthropogenic radionuclides, additional consideration must be made. There were no detections of ²³⁹Pu or ⁹⁰Sr in samples collected during this investigation, and as described in **Section 6.2**, the BTVs were established using the highest DL for the respective radionuclide. The range of the HPNS BTV for ⁹⁰Sr is generally consistent with values reported in literature. Although the range of the HPNS BTVs for ²³⁹Pu is higher than the reported values in literature, the DLs reported for the analyses of RBA samples are consistent with the quantitation limit goals presented in the SAP and are approximately an order of magnitude below the respective RG for HPNS (Navy, 2019).

Concentrations of ¹³⁷Cs in soil as a result of radioactive fallout from atmospheric nuclear testing vary across the United States. Variability has been documented through estimations of potential ¹³⁷Cs deposition by latitude (UNSCEAR, 1977, 1982) and regional differences in deposition (United States Department of Health and Human Services Centers for Disease Control and Prevention and National Cancer Institute, 2005). The range of HPNS ¹³⁷Cs BTVs are generally consistent with values reported in literature. Additionally, although there were only six detections of ¹³⁷Cs in the onsite RBAs, the results represent concentrations from non-impacted areas, including concentrations that may be encountered in areas where surface runoff may cause ¹³⁷Cs from fallout to accumulate over time.

The BTVs in **Table 7-1** are estimates of the upper range of background levels based on the available data and should be considered approximate. This is particularly true for those ROCs with a low percentage of detection. Increased uncertainty is associated with the estimation of upper bound statistics for datasets with a limited sample size and containing a low frequency of detectable concentrations. An individual site concentration exceeding the ambient BTV may be a signal that the background population and site population are not equivalent, or it may simply be an extreme value of ambient background. Based on the uncertainty in the BTV estimates and the potential for false positives (e.g., with a 5 percent false positive rate; assuming 1,000

comparisons, 50 exceedances would be expected), an exceedance of a BTV for an ROC should not automatically be considered site-related contamination; rather, an exceedance in this case warrants further consideration with the project team and evaluation of other lines of evidence, including site history and applicable literature values.

7.2 Hunters Point Naval Shipyard Site Data Evaluation

This section discusses data evaluation for the planned removal site evaluation activities at Parcels B, C, D-2, E, G, UC-1, UC-2, and UC-3 and for any future site characterization efforts at HPNS.

7.2.1 Removal Site Evaluation

The soil data evaluation process for demonstrating compliance with parcel-specific Record of Decision Remedial Action Objectives was established in Step 6 in Section 3.1 and detailed in Section 5 in the Parcel G Work Plan (Navy, 2019). Based on feedback received by USEPA on the Draft version of this report (**Appendix A**), RBA-SanBruno will be used as the initial background data set for evaluation of site investigation data. In summary, the data evaluation process is as follows:

- Compare each ROC concentration for every sample to the corresponding RG.
 - If all concentrations for all ROCs for all samples are less than or equal to the RGs, then compliance with the Record of Decision Remedial Action Objectives is achieved.
- Compare sample data to BTVs calculated using RBA-SanBruno data (i.e., offsite BTVs). Additional analyses may consist of population-to-population comparisons between sample data and RBA-SanBruno data.
- If sample data suggest that RBA-SanBruno is not representative of site background conditions, compare sample data to appropriate RBA data from HPNS. Multiple lines of evidence will be evaluated to determine whether site conditions are consistent with NORM or anthropogenic background. The data evaluation may include, but is not limited to, the following:
 - Determination if the sample was collected in an area with a known or suspected release.
 - Use of a BTV, comparison with appropriate background soil concentrations of radionuclides reported in literature, population-to-population comparisons, graphical comparisons, or evaluation of equilibrium conditions.
 - If any result is greater than the RG and cannot be attributed to NORM or anthropogenic background, remediation will be performed prior to backfill.

Sections 7.2.1.1 through 7.2.1.4 provide more detail regarding the background data evaluations.

7.2.1.1 Comparison with BTVs and Other Background Data

If BTVs are used for site data comparisons, the offsite BTVs will be used for initial comparisons with HPNS site data collected. The Navy may consider data collected from onsite RBA-1, RBA-2, and RBA-4 as part of a secondary evaluation when determining whether a sample result that exceeds both the RG and offsite BTV represents background or site-related contamination. Other background soil areas with similar soil types, colors, geological conditions, or other characteristics may also be considered for use in a secondary evaluation.

The background values will be used to indicate which site locations have concentrations of ROCs that would have a low probability of coming from a population equivalent to the ambient population. If ROC concentrations found at a site are less than or equal to the background values, then site ROC concentrations will not be considered reflective of site-related contamination. If ROC concentrations at a site are greater than the background values, further consideration with respect to literature values may be warranted. If background values are exceeded in greater than 5 percent of the samples, central tendency (population-to-population) comparisons between site and background sample results may be conducted.